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GROWING CHRISTMAS TREES IN ONTARIO



ONTARIO

DEPARTMENT OF LANDS AND FORESTS

HON. RENE BRUNELLE, Minister

G. H. U. BAYLY, Deputy Minister

ABSTRACT

Growing Christmas Trees in Ontario

In the past, there have been a number of unsuccessful attempts to produce quality Christmas trees because growers have lacked sufficient knowledge and skill in the establishment and subsequent care of their plantations.

“Growing Christmas Trees in Ontario” was first published in 1955 to overcome some of the problems facing the novice Christmas tree grower. Since then, the bulletin has been revised several times, and more stress has been laid on marketing in the present publication.

Further information and help to the grower is available from the Department of Lands and Forests field offices as a part of their free Advisory Service. Growers will further benefit by attending annual Christmas tree growers’ field days and meetings throughout the province.

General publications



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GROWING CHRISTMAS TREES IN ONTARIO

TIMBER BRANCH



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Prize-winning Scotch pine Christmas tree, Royal Winter Fair, Toronto, 1969.

INTRODUCTION

A natural evergreen tree in the home at Christmas time has become a part of Christmas festivities throughout Canada and the United States. The production, harvesting and merchandising of trees for this purpose has created a thriving industry in Canada.

Although most Canadian Christmas trees used to come from natural woodlands, millions of trees are now being planted in southern Ontario primarily for this special use. The quality of planted trees, well spaced and cared for while growing, has surpassed wild stock cut from the tops of trees in the swamps. (There is an excellent opportunity to culture wild spruce and balsam using similar techniques to those employed in plantations.)

Most Ontario plantations have been established on light, sandy soils, cleared originally for farming. They range in size from a few acres, operated as part of a farm, to several hundred acres planned as a specific Christmas tree production enterprise.

To produce a high percentage of good quality trees, a grower must prune to improve their shape, spray when necessary to control insects, and provide adequate protection from fire, grazing and theft.

With species such as the spruces, even if the Christmas tree market fails, the trees will later produce merchantable crops of pulpwood and sawlogs. Indications are that most varieties of Scotch pine have not proven satisfactory for timber production in Ontario. It is worthy of note, however, that an open stand of Scotch pine provides cover under which hardwoods may seed-in naturally in later years.

SOME FACTORS IN PLANNING PRODUCTION

DESIRABLE QUALITIES IN CHRISTMAS TREES

The greatest demand is for evergreen trees with uniformly dense, symmetrical crowns and with lateral branches stout enough to hold ornaments. Foliage of an agreeable scent and colour is highly desirable. The ability to retain its needles well after being cut and brought indoors, or during long-distance shipment, explains much of the recent trend to the use of Scotch pine in plantations. Balsam fir also holds its needles well. Most of the spruce and balsam fir on the market is wild stock, but some spruce is being planted. Balsam has been unsuccessful in most plantations as it thrives better in moist sites.

SOURCES OF NURSERY STOCK

Nursery stock is furnished by the Department of Lands and Forests subject to the prescribed regulations. Some commercial nurseries are now advertising nursery stock for Christmas tree production.

PLANNING THE PLANTATION

General information on reforestation and woodlot management is carried in the Department of Lands and Forests publications, "Planning for Tree Planting" and "Forest Tree Planting". Advice in planning the plantation may be obtained from the local office of the Department. Consultation with a forester is particularly important if Christmas tree and timber production is to be combined on one area. A field inspection may be arranged by contacting the local office of the Department. There is no charge for this advisory service.

CHOICE OF LAND

Reasonably level land, comparatively free from stones or stumps to permit easy operation of a tractor and mechanical planting machine, is preferred for large plantations. Accessibility to travelled roads under winter conditions, and distance from markets, are also important considerations. The lighter soils, where aeration and drainage are good, grow the best Scotch pine. Heavier soils are better suited to the spruces. Cut-over land often regenerates naturally to balsam fir and this situation lends itself to the culture of wild trees.



Two-man tree planter.

SPACING

Where trees six to eight feet in height are the objective, a spacing of 6 ft x 6 ft is recommended. This would require 1,210 trees per acre.

If there is a ready market for table trees, two to four feet high, a spacing of 4 ft x 4 ft, requiring 2,722 trees per acre, may be used. This is a limited market, and large plantings are risky.

PLANTING METHODS

Detailed information is carried in the Departmental publication "The Care and Planting of Forest Trees". Early spring planting usually results in best survival.

PROTECTION OF A PLANTATION

Possible Hazards Fall Into These Classes:

1. Fire
2. Insects
3. Birds
4. Thieves and trespassers
5. Competition from other plants
6. Animals
7. Disease

PROTECTIVE MEASURES

1. Fire. A cultivated fire-break may prevent a grass fire from entering the plantation and is also a good place to fight the flames, should fire occur.

The owner may request the township council to pass a by-law regulating the setting of grass fires and their control, if no such by-law applies now in that township. If fire protection is provided, he should show the telephone number to call, in case of fire, on his boundary signs.

Fire losses may be reduced by providing fire-breaks at intervals throughout the plantation.

2. Insects. The best protection is to know the enemies and their control so that action may be taken as soon as a danger appears. Information and advice may be obtained from the Ontario Department of Lands and Forests offices or from the Forest Research Laboratory, Canada Department of Fisheries and Forestry, Sault Ste. Marie, Ontario; their research technicians work throughout Ontario.

Most damage in the past has been done by the European Pine Sawfly, in southwestern Ontario, and by other sawflies, weevils and budworms.

If spraying is necessary, it may be done on large areas by aircraft, or by portable mist blowers on small acreages (less than 100 acres). Contractors with equipment for this work may be named on your request. Costs are usually from three to five dollars per acre.

3. Birds. Grosbeaks may come in the winter and eat off most of the buds which would otherwise develop into twigs and foliage next year. Many defects result from these attacks.

No satisfactory measures can be recommended to control this source of loss. Careful pruning in later years may restore the form of trees spoiled by the removal of buds by birds.

4. Thieves and trespassers. Good fences, a locked gate and a careful

watchman in November and December reduce losses. Co-operative neighbours will report suspicious entrants. Signs, forbidding entry except with permission of the owner, will control hunters and hikers, if the owner will enforce his order.

5. Competition from other plants. Brushy plants, such as thorn trees, wild apple trees, dogwood and poplar, must be restrained by cutting or spraying with selective plant-killing sprays. Mowing of weeds is sometimes practicable and necessary.

6. Animals. A limited amount of grazing by farm animals may be beneficial when there is a heavy growth of grass or hay, but mechanical injury by trampling may well out-weigh the advantages. Good fences keep livestock out.

Mice, given heavy grass cover, may build up a heavy population and girdle young trees. Controls may be required, and reduction of grass cover is effective. Poisons should not be used except under well controlled conditions as stipulated by the Department of Lands and Forests. Rabbits and hares, when food is scarce in winter or early spring, will nip off the leading shoots; careful pruning to correct the shape of these trees is usually needed. Hunting helps keep the population down.

7. Disease. Leaf rusts may lead to browning of the needles but the risk does not warrant the expense of protection.

Fungus diseases, which attack the roots and kill trees, require expensive soil sterilization to control them. Seek professional advice if trees are dying.



A fire-break of cultivated soil protects plantation.

CULTURE

OF CHRISTMAS TREE PLANTATION

PRUNING AND SHEARING

The term, “pruning”, usually refers to the cutting of individual woody branches, while “shearing” refers to overall clipping of the crown of the tree. Trimming embraces all treatments designed to produce well balanced and bushy specimens.

For the first two years after planting, growth is usually slow while the tree is becoming established, but speeds up once the root system has been developed. This results in a tree which is tall and spindly.

Experienced Christmas tree growers differ in the methods which they employ, and the following should be regarded as suggestions rather than rules:

1. Shaping the trees should usually commence two to four years after planting. Under exceptional conditions, such as large planting stock, trimming should be done the first year.
2. The pines are usually pruned or sheared during the growing season, normally in southern Ontario from mid-June to mid-July while the new growth is still succulent. After the leader and side branches have been trimmed, they must develop new buds to replace those removed. Early pruning produces strong, vigorous buds which result in correspondingly longer twigs next year. The farther the cut is from the growing tip, the less vigorous are the buds produced after the cut. In some cases, severe or late pruning stimulates very little bud development.

Spruces and balsam fir are trimmed during August for best results, but the work can be done anytime before April of the next year.

3. Multiple leaders should be cut out to establish a single leader, and long leaders or side branches should be cut back to attain the desired taper and outline.

Growers should visit an experienced operator or attend a Christmas Tree Growers field-day to learn the technique at first hand.

For further advice on pruning Scotch pine or balsam fir, see the appendices.

SOME FACTORS IN HARVESTING AND MARKETING CHRISTMAS TREES

Because marketing is the most difficult phase, you should investigate the probable capacity of your market and aim to produce no more than you can sell. Trees should be cut and sold when they will return the most profit, considering all the risks involved.

To sell trees, the producer must take these steps:

1. Have a product which is wanted.
2. Know his product and be able to quote numbers, size, grade, species and location of his trees.
3. Locate a buyer or buyers.
4. Make a bargain to sell.
5. Provide the product sold at the time and place specified.
6. Collect payment.

DETAILS OF SELLING PROCEDURE

1. *THE PRODUCT*

(1) *Size.* Most buyers want trees 6'-8' high but will accept a few outside that range. In the harvesting operations, short trees result from cutting off crooked butts, broken limbs or weak bottoms.

(2) *Species.* Scotch pine is preferred; but shapely balsam fir or spruce command good prices.

(3) *Grades.* Best grades bring highest prices. All trees offered for sale should be graded according to some standard or another even if the grading is only to "merchantable" and "cull". Obtain a copy of the official Ontario grading rules. All grading should be done by the producer while the trees are standing, preferably in August or September. The grading may be certified as satisfactory or not by applying to the Farm Products Inspection Branch of the Ontario Department of Agriculture and Food, Parliament Buildings, Toronto.

2. *INFORMATION NEEDED FOR A SALE*

The producer should know exactly how many trees he has in the 6'-8' range, the grade, the number in each field, the species and any other relevant information. To get these facts he should tag all the trees he offers for sale, grading them at the same time. As he goes over each tree carefully, he should remedy any minor defects. Dead twigs, double tops, foreign material, abnormally long branches, excessive number of twigs in one spot, and poor balance are examples. Such actions may well bring a tree up a grade.



Cutting Scotch pine Christmas trees with chain saw.



Loading trees in the field.

As each field is done, a list should be made showing the number for sale by species, grades and sizes, and the asking price per tree.

A sketch map, showing exact location, may be needed later.

3. *FINDING THE BUYER*

(1) *Wholesale buyers.* They usually deal in thousands and want the best trees. They expect a profit on the price paid.

(2) *Retail Dealers.* No list is available as there is a great change in dealers each year. Best advice is to locate local dealers by observation, enquiries and advertisements. When you find one who has been in business for some years, cultivate his good will. Early contacts are needed.

(3) Place a good sign, advertising trees for sale, on the property. This spreads the word.

4. *MAKING THE BARGAIN.*

(1) *Point of sale.* Trees may be sold Standing, on the stump; Cut, skidded and piled at a truck road; or Delivered to some city, town or rail siding. If the buyer does the cutting, the producer needs to exercise control to ensure that the cutting is done correctly and that only the stated area is covered. As cutting, piling and delivery involve expense, these extra costs must be included in the selling price.

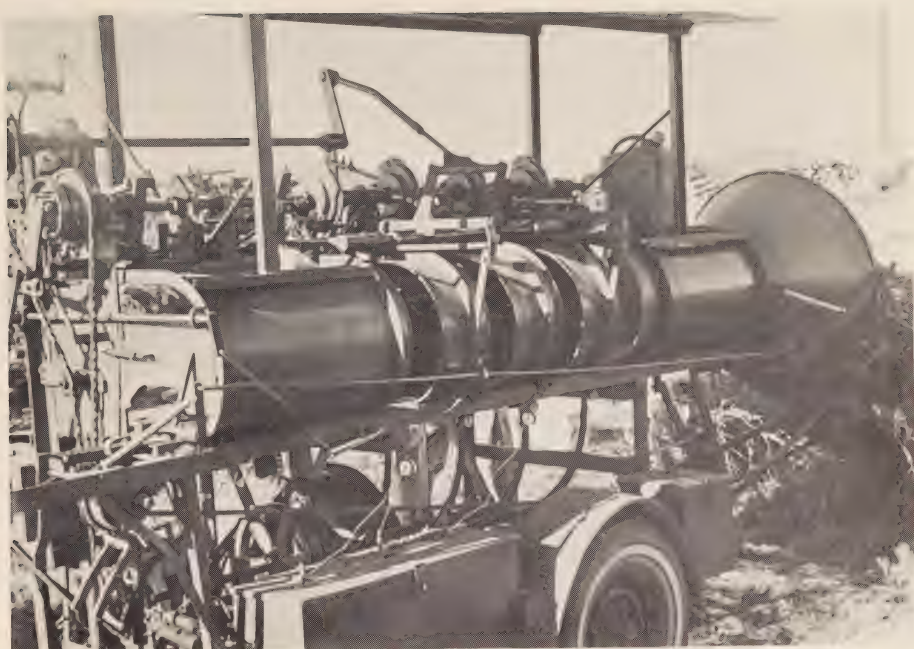
(2) *The bargain.* The buyer should state what he wants—the number, species, grade, size and delivery information. The producer may then show him the trees which meet those needs and discuss price. It is important that the buyers should view the trees standing and be satisfied with them, to avoid disagreement later.

After a verbal agreement has been reached, a confirming written statement or agreement should be made and signed by both parties, specifying the number, species, size, point of sale (date and place to deliver) price and terms of payment. A substantial advance payment will seal the bargain.

Although most buyers are quite trustworthy, you need to be wary. In dealing with unknown buyers, avoid those who will not take a firm bargain confirmed with a deposit but ask you to hold your trees for them while they scout for a better buy. Do not release your trees until you have in your hand the full payment in cash or certified cheque.

5. *PROVIDING THE TREES*

(1) A sale of trees standing requires that the owner or his agent



Tree Baler.



Christmas trees, baled and tied with twine.

should be present when the trees are cut, to see that the conditions of sale are observed.

(2) Cutting, skidding and piling at the roadside is best done when the weather is right, which is usually in early November, a week or more before the trees are to be loaded. Snow and rain can make this job disagreeable. Yellow trees may be spray-painted green. Baling or tying is essential to facilitate handling at all points, to protect the quality of the tree and to assure handling will be possible even in temperatures below 20° F. If trees are graded, the grades should be piled separately.

(3) *Delivery.* Small lots of 100 to 300 may be hauled by stake truck. Forty-foot stake-body trailers are used for larger lots. The number on a load varies with the size of the trees and the skill of the man arranging the load. 500 trees, 6'-8' in height, is an average load 12'-13' high. A farm wagon is a useful stage in hoisting the trees to the highest levels. Three men are needed to load as well as a tallyman. The tallyman should call the count of trees as each one goes up, and the loader should echo his count loudly to avoid mistakes in counting. A tally counter is useful at this stage.

Ontario traffic laws forbid a height greater than 13 feet, 6 inches, and a width of more than eight feet for a multiple load. Careful tying with rope should prevent slippage and loss in transit, but as a tree on the highway is a dangerous traffic hazard, it may be advisable to follow the truck in a car.

The truck driver should have a bill of sale to show police that the trees have not been stolen.

(4) *Delivery to U.S.A.* Canadian Customs offices in any city will provide a simple form (B-13) on which to specify the items carried, their origin and value, as well as the name and address of shipper and consignee.

The United States appraiser of merchandise, Mr. John F. Chilton, 121 Ellicott Street, Buffalo, New York, will supply the import regulations and forms on request. Do not attempt to export to the U.S.A. without having an address for the American consignee.

The export of Christmas trees no longer requires the issuance of export clearances by the Ontario Department of Lands and Forests (except in northern Ontario where the trees come from Crown land).

6. *COLLECTION OF PAYMENT*

If the buyer is trustworthy and prompt, the seller has no problem. If not, the producer should insist on payment in full, by cash or certified cheque, before he gives possession of the trees to anyone.



Baling with a metal cone and packaging with plastic netting.



Loading box car with conveyor: approximately 800 trees per car.

POST HARVEST CLEAN-UP

Even the best plantations have some cull, and the cutting operation leaves butts, branches and other debris on the ground. This material should be piled and burned to remove a possible brooding location for the weevil population.

Dying stumps are essential for Pales weevil to lay eggs and raise young. Fresh-cut stumps should be treated with Sodium Arsenite* immediately after cutting or in the early spring. Treatment makes stumps unattractive to the adult female, and no eggs are laid.

*Control information is available from your local District Forester.



Prize-winning spruce Christmas tree, Royal Winter Fair, Toronto, 1969.



Prize-winning balsam fir Christmas tree, Royal Winter Fair, Toronto, 1969.

CHARACTERISTICS OF SOME SPECIES

	SCOTCH PINE	WHITE SPRUCE
Sale	Excellent	Excellent for pruned trees. Good for others.
Approx. yrs. to reach 6 ft.	6-10	7-15
Ability to hold needles after cutting.	Excellent	Poor
Need for pruning.	Great	Some to much
Enemies	Sawflies, *shoot moth, porcupine, mice, deer, rabbits, grosbeaks, white pine weevil and other † weevils.	Spruce sawfly, spruce gall aphid, spruce budworm.
Notes	Not a suitable timber tree but is used for pulpwood. Must be trimmed during growing season.	Pruning may be done August-March.
	Grows well on well-aerated, well-drained soils.	Will thrive best on well-drained soil where moisture is ample.

† Infestation of other weevils arises only in the immediate area where extensive harvesting of Christmas trees has taken place.

*Shoot Moth: This insect has proved very difficult to control directly but population has been controlled by natural agents. Pruning reduces damage to slight proportion.

USED AS CHRISTMAS TREES

BALSAM FIR	WHITE PINE	RED PINE
Excellent for pruned trees.	Fair	Fair
7-10	7-10	6-9
Good	Good	Good
Some to much	Some	Some
Spruce budworm.	Blister rust, weevil, wet snow, mice, rabbits.	*shoot moth, sawfly, mice, rabbits, snow breakage.
Pruning may be done August-March.	Localized demand may increase popularity. A suitable timber species.	Long needled. Coarse framework to tree. Should consider susceptibility to insect attack, particularly shoot moth.
Will thrive best on well-drained soil where moisture is ample.	Prefers medium moist sands or clay loam soil.	Must have well-drained soil. Should not be planted on heavy soils.

Although balsam fir is widely used, little is at present grown successfully in plantations in Ontario. Culture of wild trees is profitable. For further technical advice on suitability of a species to soil, moisture, and other factors, consult the local Management Forester.

REFERENCES

GENERAL:

Ontario Christmas Tree Growers Association Inc.,
R. H. Williams, Pres., (1969-70),
1884 Davenport Road,
Toronto 168, Ontario.

Flammability of Christmas Trees,
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United States Standards for Christmas Trees,
U.S. Department of Agriculture,
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Washington, D. C., U.S.A.

Christmas Trees—Grades
Regulations made under The Farm Products
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Ontario Department of Agriculture and Food,
Parliament Buildings,
Toronto, Ontario.

CULTURE:

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Canada Department of Fisheries and Forestry,
Publication No. 1041,
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Arcadian Technical Manual For Christmas
Tree Farmers (\$2.00),
Dr. H. J. Stangel,
Allied Chemical Corporation,
Nitrogen Division,
40 Rector Street,
New York, N.Y. 10006, U.S.A.

PROTECTION:

Leaflets on insects most troublesome to
Christmas Tree Growers are available from the
Department of Lands and Forests,
Parliament Buildings,
Toronto, Ontario.

European Pine Shoot Moth Damage Reduced
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Technical Note. No. 592,
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Folwell Avenue,
St. Paul, Minnesota 55101, U.S.A.

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Publication No. R.-424,
North Central Forest Experiment Station,
Folwell Avenue,
St. Paul, Minnesota 55101, U.S.A.

MARKETING:

Marketing Ohio Grown Christmas Trees
Through Wholesale Outlets,
Research Circular No. 47,
Ohio Agricultural Experiment Station,
Wooster, Ohio.

FOREST DISTRICT OFFICES

of the Ontario Department of Lands and Forests

Enquiries should be addressed to District Forester,
Department of Lands and Forests

SOUTHERN DISTRICTS

AYLMER West, Ontario	Phone: 773-9241
HESPELER, R.R. No. 1, Ontario	Phone: 658-9356
MAPLE, R.R. No. 2, Ontario	Phone: 832-2261
LINDSAY, Ontario	Phone: 324-6121
TWEED, Ontario	Phone: 478-2330
KEMPTVILLE, Ontario	Phone: 258-3411
PEMBROKE, Ontario	Phone: 732-3661
PARRY SOUND, Ontario	Phone: 746-2141

NORTHERN DISTRICTS

CHAPLEAU, Ontario	Phone: 864-1710
COCHRANE, Ontario	Phone: 272-4365
FORT FRANCES, Ontario	Phone: 274-5337
GERALDTON, Ontario	Phone: 854-1030
KAPUSKASING, Ontario	Phone: 335-2231
KENORA, Ontario	Phone: 468-9841
NORTH BAY, Ontario	Phone: 474-5550
PORT ARTHUR, Ontario	Phone: 345-6543
SAULT STE. MARIE, Ontario	Phone: 949-1231
SIOUX LOOKOUT, Ontario	Phone: 737-1140
SUDBURY, Ontario	Phone: 673-1111
SWASTIKA, Ontario	Phone: 642-3222
WHITE RIVER, Ontario	Phone: 822-2250

TRIMMING SCOTCH PINE to improve Christmas tree quality

*by E. F. Johnston, B. Sc. F.
Timber Supervisor, Lake Erie Forest District*

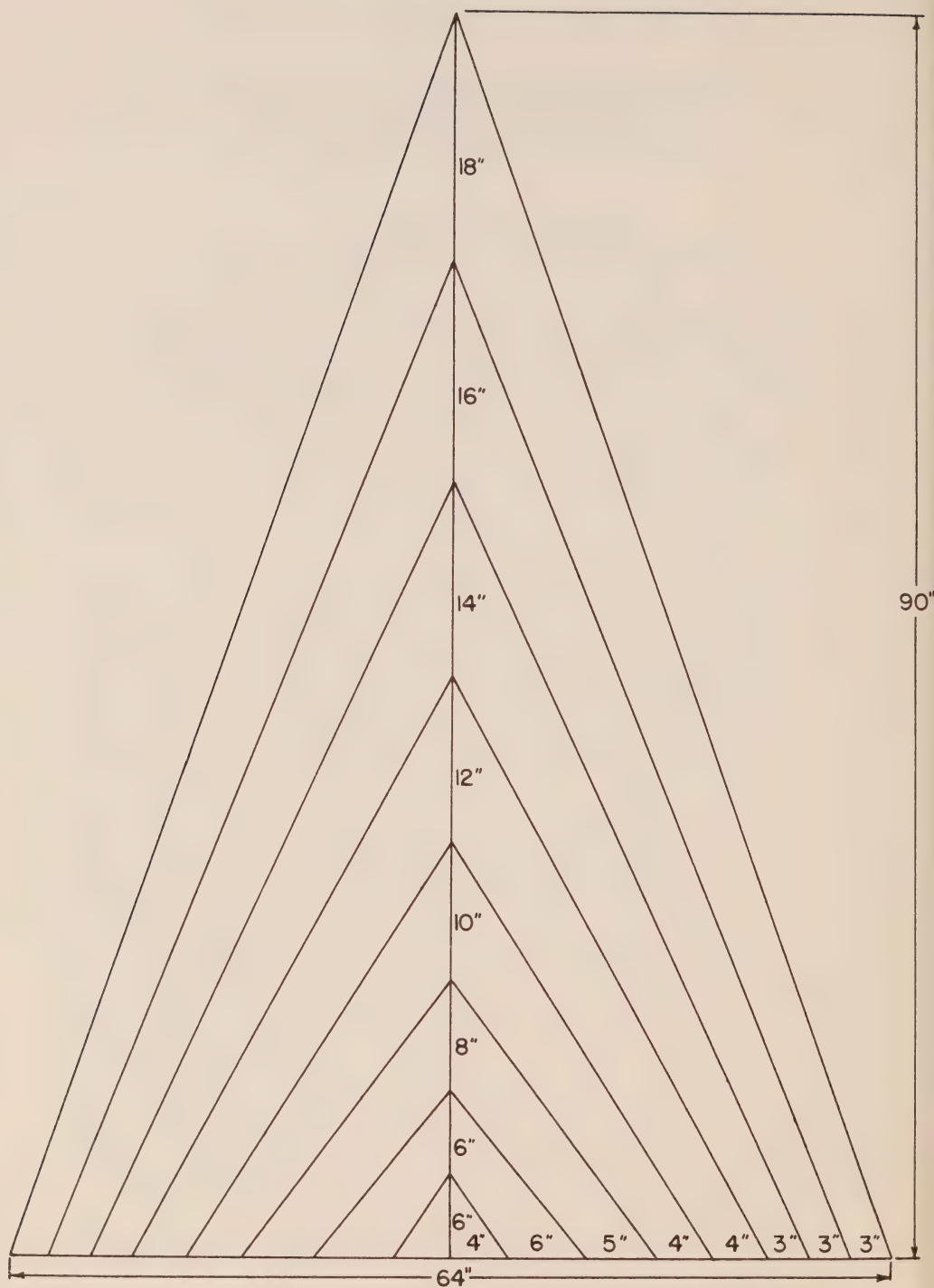
The Christmas tree of the future will be a cultured, natural looking tree of any of the species currently used for Christmas trees, and it will be of better quality than the tree of today. In support of this statement, may I point out that research has provided more basic information on all aspects of growing, and better techniques have been developed by the grower. The tree of the future *must* be better to satisfy a more discriminating consumer. Trees in the future will also bring better financial returns to the industry as a whole. The most important key to better tree production is—and will be—trimming.

The term "trimming" is used to include all cutting techniques applied to the trees to improve its marketability. "Shearing", to many people, has a connotation of severe cutting applied uniformly to all parts of the tree. "Pruning" suggests selective cutting of individual shoots and twigs but has also been used to indicate overall shaping of the tree. To avoid any misunderstanding in the meaning of terms, treatment will be defined as accurately as possible.

Scotch pine has been widely planted in Ontario for general reforestation purposes. Because of its proximity to centres of population, it has become a substitute Christmas tree for the traditional species. The first plantings were often on very sterile sites (such as blow sand) and a few slow-grown specimens had good colour, density and overall appearance. It was not long before the new species was commanding a premium on the market, and Christmas tree wholesalers began to search out Scotch pine plantations to meet the increased demand. The prospects of a ready market and generous profits encouraged many entrepreneurs to plunge into Scotch pine growing, beguiled by the misconception that it was a simple matter of planting and cutting seven years later. In the uncultured plantations, from five to twenty per cent of the trees were cut and the others were left to grow into "timber".

The gardener, who was familiar with trimming hedges and ornaments on lawns, began to apply his techniques to the Christmas

- MODEL TREE -



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TAPER FACTOR-71%

tree trade. These developments were occurring in Ontario during the period 1945-50. It soon became apparent that the trimming of Scotch pine required a new technique (unlike that being applied to ornamentals) because of the new buds which formed below the cut. This is different from most other species where cutting simply causes an accelerated development of the buds normally present between the annual branch whorls.

THE NEED FOR TRIMMING

On most sites, untrimmed pines grow so rapidly that they appear coarse and open and lack density and shape. Trimming, by shortening the annual growth, has the effect of telescoping or compressing the tall rangy tree into a short, dense, compact tree. Control of the overall outline is also achieved in this telescoping process. It has been found that, after trimming at the proper time of year, new buds form in the axil of the needle cluster, and there are from two to five times as many new ones as the number cut off. The character of the shoots and needles resulting from these adventitious buds differs from that of normal buds. The new growth is less coarse; because there are more twigs, a finer texture is imparted to the tree. During the annual inspection (which goes with trimming), you can also eliminate the deformities caused by mechanical damage, undesirable growth and insect, rodent or bird damage, and so maintain the density and taper achieved in the trimming operation.

TIMING OF TRIMMING

There are two aspects in timing: one, the age of the plantation; and two, the time of year.

Plantations should have a cursory inspection in the second growing season. At this time, double tops (two trees in a hole) and other noticeable problems can be corrected. On good sites, leaders may be up to 15 inches long in the second growing season; these should be shortened to from six to eight inches, and laterals in the upper whorl shortened accordingly. This inspection could be organized on a three-row-pass basis where each man inspects three rows as he walks very slowly. The cost of treatment is low, but results are worthwhile.

In the third growing season, the initial trimming should be carried out on all trees showing adequate vigor. The trimming treatment has now been established for the plantation and must be continued annually until harvest or the full potential for Christmas trees will be lost.

Research by Larson indicated significant differences in the response of trimmed Scotch pine trees according to the time of year of

trimming and the percentage of the new growth removed. Best response is secured if the trimming is carried out when the new growth is three-quarters developed or just before hardening of the shoot begins. June 25th to July 15th is the best period for most of Ontario. Further south in the United States, it will be somewhat earlier. Merchantable trees should be trimmed at this time to produce large, attractive buds. Early trimming will encourage a more varied texture to the crown because uncut shoots will continue to grow, while the cut shoot elongates only slightly. This characteristic can be used to good advantage in producing a natural looking tree. Other age classes may be trimmed before this most favourable period or after; although results will not be optimum, losses should be insignificant.

OBJECTIVES

The objective of most Christmas tree growers is to maximize their profits by bringing the largest number of trees to merchantability for the best possible price at the lowest cost. Trimming has a greater impact on this objective than any other phase of the growing operation.

Let us assume we wish to grow a tree six to 7½ feet tall in seven years, with a 75 per cent taper factor, medium to heavy density, a strong single main stem, fresh green foliage and a minimum of defects. This, in short, is the traditional Christmas tree which has been a top quality spruce, balsam fir or Douglas fir in the past, but which may also be a pine with good trimming techniques. With a little good luck and much good management, we can achieve this objective most of the time.

TRIMMING FOR QUALITY

As in other new fields, there is a tendency to move from one extreme to the other, and tree trimming is no exception. Encouraged by the first response of trees to trimming, many growers began to cut more and more severely. Five years after the inauguration of trimming, we were offering trees on the market that were too dense and looked "hedged". The natural appeal of the tree had been lost, and the cultured pine Christmas tree suffered a set back in consumer acceptance. Over-trimming resulted from lack of knowledge by the grower, lack of direction and supervision of the trimmer, and a mistaken belief that this was an improvement on the natural tree. Trimmed trees can have all the improvements of cultured growing and still have that "natural look".

If we are to trim for quality, we must remove the mass production aspect from the trimming operation and treat each tree as an individual. Individual treatment may cost up to 20 per cent more, but the improved returns will more than compensate for the additional expenditure.

TRIMMING TOOLS

A wide variety of tools have been used to trim trees, ranging from hand secateurs to power driven hedge trimmers. Each has its own special problems and advantages, but, in recent years, most trimming has been done with hedge shears.

Knives have become popular in the past few years, and savings of up to 25 per cent are claimed in their use. The indiscriminate type of cut achieved with a knife limits its use in quality trimming. With one stroke, the knife may cut laterals in the upper whorl, new growth on the sides of the tree and old growth in the lower segment. Differences in growth response will be apparent next year. A knife is better suited to the mass production type of trimming where a lower grade product is produced at a minimum cost. The hazard of injury to the worker is a constant threat and a financial liability which few small growers can assume.

In this talk, we are using a combination of hand secateurs and hedge trimmers for most treatments. Each worker is equipped with a belt holster in which to carry the secateurs when not in use.

TRIMMING OPERATION

Step One, From a distance of six to ten feet, assess the overall need of the tree. Inspect the handle, taper factor and internal structure, and look for defect. Project an imaginary line from the handle through the body of the tree to the top growing tips. This will indicate a best choice for a leader. Move in close to the tree and select a leader through a plane of 90° to the first inspection.

Step Two, Isolate the leader by removing all competitors with the secateurs. If the highest whorl of laterals is heavy (15 or more strong shoots), thinning is required and should be carried out at this time. Reduce the number of laterals to from 12 to 15 by removing the inner portion of the whorl (those closest to the leader) or by taking alternate laterals. The hedge trimmers are held in the left hand and used to steady the upper part of the tree while the secateurs are used in the right hand.

Step Three, Strike an imaginary line which will give the desired taper factor from the base of the tree up along the side to the leader. Trim the lower segment of the tree, working around the tree as a tangent is drawn to a circle. This enables the trimmer to see the slope of the tree from bottom to top and assures that no gouging in a radial direction will occur. Move around the tree; trimming the lower and middle sections. Follow the imaginary slope of the tree and trim all laterals in the upper whorl to fit this slope. Laterals which are too long cause "shoulders" and are very difficult to remove next year. If the laterals are strong, shorten them to at least one inch inside the general slope of the tree.

Step Four, When all other trimming has been completed, the leader is cut on a 45° angle at a length which will conform to the established slope of the tree. This is very important since taper, texture and density can be adjusted in this single cut. Pre-determined limits for various ages will serve as a guide to leader length, but slope and, hence, taper factor, are most important.

Step Five, Assess the tree and the results achieved through trimming. Texture may be adjusted at this time by judicious thinning possible in the middle and upper segments. This last look at the tree may indicate a need for touch up or better practice. An occasional look back will improve performance noticeably.

The internodal distance for each year governs the internal structure and the frame work on which we grow a veneer of foliage in the last two or three years of the rotation. Too often, we develop and hold our trees in a state of merchantable density from the third growing season to the date of cutting. This is wasteful, costly and extends the rotation needlessly. The internodal distance will also influence stem diameter which affects weight and mountability in the tree stand. Tying and bundling and all aspects of transportation are facilitated by longer internodes and flexible internal structure. Build a skeleton of branches and put a veneer of foliage on the framework in the last few years of the rotation. The tree is raised, using each year's growth as a building block. To be successful, we need a well conceived building plan in advance of construction. This plan will schedule the work to be done for each year. The work will be co-ordinated from year to year so that the parts may fit together.

Our model tree has a taper factor of 70 per cent. It is progressively less dense as we move from the lower to the middle and upper segments. This will give the tree good balance and a stable appearance to the eye. Variable density is a feature of the growth pattern of most trees. The tree grows most vigorously in the upper portion, and this condition moves upward as height increases. For example, in eight-foot trees, laterals in the upper whorl may grow 16 inches per year while laterals in the lower segment grow only four inches. This ratio of height to lateral growth controls the taper of our conifers. The vigour of the growth pattern may be used to promote the development of different parts of the tree at different times. Our plan for developing a tree prescribes the growth of a broad base when vigour is in the lower segment and rapid height growth in the upper segment when vigour moves up and leaves the base.

At three years of age, our tree has a taper factor of 150 per cent which we will change to 70 per cent by adding more height than lateral

growth.

The progressively longer, leader length changes taper factor and achieves the objectives of improved taper and density. This plan (developing a tree in seven to eight years) is sound and can be implemented by most growers.

YEAR	INTERNODAL LENGTH	LENGTH OF LATERAL
1	6"	4"
2	6"	6"
3	8"	5"
4	10"	4"
5	12"	4"
6	14"	3"
7	16"	3"
8	18"	3"
Total	90"	32"
Total width		64"

All too often, we see eight-year-old trees that are 36 inches high or a six-foot tree on which the leader has been needlessly reduced to four inches. A note of caution is in order here. Do not attempt to change your growing plan by using longer, annual internodes unless there is a broad base on which to build.

Leaving internodes of from 12 to 18 inches may require courage, but faith, understanding and experience in the tree growth potential will substantiate the wisdom of this practice.

PROBLEMS

The most serious problem in trimmed Scotch pine is crook or sweep in the main stem of the tree. Annual cutting of the leader induces multiple tops. Damage to buds produces distortion and weakening of the top growth. All contribute to crook or sweep. Every effort should be made to keep the main stem of the tree straight and distinct, with no heavy vertical branches that detract from the appearance. This can be accomplished by selecting an individual leader each year and removing all competitors.

Bird damage by grosbeaks and related species has become a problem for growers during the past few years. The adventitious buds formed after trimming are an attractive winter food supply for these birds. Flocks of grosbeaks winter near trimmed Christmas tree plantations and have been known to remove up to 90 per cent of all buds above the snow

line. Damage is most serious when it occurs to the leader; it may result in complete loss of the leader, multiple tops or serious crook. When all buds have been eaten by birds, new ones form (below those removed) during late May and early June. These will produce short, irregular growth of up to eight inches during the current growing season. When this occurs, it is best to leave the growth for one year and sort it out next year when the shoots have returned to normal. When bird damage is heavy in the top of the tree and light on the sides, there is a danger that taper will change from normal to flaring. Under these conditions, heavy trimming of side branches and increased leader length is recommended in subsequent years.

Insect and mechanical damage may result in leader loss. When this occurs, every effort should be made to restore a central main stem rather than round off the tree to a multiple top. Time will solve some leader problems but definite action should be taken immediately in 90 per cent of all such cases.

BUDS ON—BUDS OFF

In most of our trimming, we make a special effort to remove all buds from the leader and the upper whorl of branches. This assures that no significant growth change will occur on the cut shoots and that new buds will form below the cut. When leader problems develop, it is possible to restore the leader, using any lateral in the upper whorl by leaving the buds on; when buds are left on, phototropism will cause the ends of the shoots to turn upwards. It is possible to induce this “curl-up” in any lateral in the upper whorl.

With the buds on, the growth next year will be of the untrimmed pattern (which will change the texture and character of the tree slightly) but this can be overcome in one year’s trimming. A “curl-up” can also be used to re-establish the main stem following heavy bird damage or insect attack.

Having the buds on will promote growth during both the current and following year. Weak parts of the tree can be strengthened by this technique, and defects, such as goose necks, flat tops, layers and holes, may be repaired. Buds-on is a very useful tool but must be applied carefully.

CULL

In spite of our best efforts to bring every tree through, there are those specimens which, because of inherent characteristics or history, cannot make the merchantable grade. When it is probable that a tree is a cull or will develop into one, it should be removed as soon as possible.

The trimmers can bend these trees over by stepping on them and cut them off at ground level with secateurs in all sizes up to five-year-olds. In larger trees, cull tags may be used to mark the trees for cutting at a more convenient time.

The practice of culling trees during the trimming operation pays big dividends by reducing the clean-up job following cutting, by avoiding insect and disease build-up, and by creating a good impression with perspective buyers. A plantation of merchantable trees with no cull is a "buyer's dream."

CREW TRAINING

The trimming operation is too large for most growers to handle alone and they must, therefore, rely on paid labour to do most of the work. Growers may understand trimming very thoroughly, but unless this information can be transmitted to the man doing the job, the results of the trimming will be disappointing. Take time at the outset of the operation to explain to the crew the details of tree trimming and to demonstrate technique, proper use of tools and safety. Up to one hour could be spent at this profitably.

As the work progresses, add new information to the workers' knowledge and insist that advanced techniques be applied. Short-cut trimming costs the grower money and produces mediocre trees. A review should be held every two hours for the first day and every four hours the second day. Individual instruction is going on at all times as the foreman gives advice and assistance with problems. A foreman can supervise no more than 12 trimmers effectively, especially when the workers are unfamiliar with trimming. The foreman should not take a row because this ties him down, but should be available for problem solving, maintaining discipline, and for guidance in all aspects of the work. This man's time is not entirely lost to productive work since he can help the slower trimmers or work ahead of the crew on the premium grade trees. The better the tree, the greater the need for quality trimming.

These theories and remarks on Christmas tree production may be somewhat provocative, but the basic principles are sound. Some modification to suit special situations or local conditions may be required.

BALSAM FIR

CHRISTMAS TREE PRODUCTION

There appears to be a good opportunity to increase balsam fir Christmas tree production in Ontario. In the past, it accounted for less than one per cent of Christmas trees sold in the province despite its natural occurrence on substantial areas in the province.

Balsam fir has many desirable qualities—dark green colour, fragrant scent, excellent needle retention up to six years, straight stem, and attractive shape and outline. Ease in shearing and capacity to resist damage in handling are also in its favor.

Balsam fir requires a cold climate and abundant moisture, a mean annual precipitation of 30 inches or more well distributed throughout the year, and average temperatures of 70° F. or less. It grows on many different types of soil and over a wide range of drainage conditions. To produce and retain the abundant foliage desired for Christmas trees, dry, gravelly situations should be avoided. Abundant moisture, but good drainage, are essential.

Those parts of Ontario which lie on the Precambrian shield north of Highway No. 7 satisfy most of these requirements.

There is an opportunity for landowners within its natural range to produce good-quality Christmas trees at a profit. Naturally seeded trees, which are too sparse crowned, may be improved to saleable quality by pruning. Transplanting wildling seedlings may also be carried out, but this takes longer. In natural stands, cut-over areas regenerate easily to balsam fir. Forty to sixty-thousand trees per acre are common. Since a range of age classes are usually found on an area, good management will yield a continuing harvest even without planting.

One of the first considerations is accessibility. This applies both to easy facility for hauling loads out in wet falls or early winter and getting around in the plantation. The easiest way is usually to re-open the old logging roads through the property. You may have to repair some of the broken down stream crossings.

THINNING

Balsam must have full sunlight to develop attractive Christmas tree form. This means that, in clumps, you must cut back adjacent trees to

give space to the specimens showing the best form, colour and needle density. Aim at a spacing of six feet each way as trees reach merchantable size. Other species which compete for space should be cut.

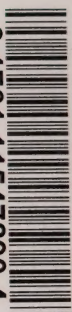
PRUNING

The ideal shape toward which you should aim in pruning this species is a cone where the width at the base is almost three-quarters of the total height to produce good Christmas trees. Trees up to ten feet in height may be treated in the following way.

Choose a whorl that has four or more strong side branches which will form a good base. Before growth begins in May, prune off all branches below this whorl. The shock of this treatment slows down height growth and stimulates production of new foliage. In July of the following year, choose the best leaders and cut back those which compete. Trim off the ends of overly long side branches to give a smooth, conical outline. Cut back the leader, too, if it is very long. Make your cuts just above an intermediate bud. Repeat such trimming annually until the tree is harvested.

Balsam fir has fewer insect problems than Scotch pine. It does suffer from spruce budworm outbreaks but needs less insect protection than most other Christmas tree species.

The general shape, branching habit, needle arrangement, and pleasing fragrance make this species more desirable than pine or spruce to many people. Ease of regeneration by natural seeding, and minimum necessary care of stands growing under favorable conditions, make this species worth investigating by a Christmas tree grower.



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